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x PI 243.532; and PI 229.342 x Hurrelbrink, gave all sensitive F_2 plants (about 200 plants tested in each cross).

The F_2 of crosses of sensitive with tolerant segregated three tolerant to one sensitive, as tabulated below:

Cross	Tolerant	Sensitive	Expected	X^2P
PI 229.342 x Clark 63	461	158	464.2:154.8	.8
Clark 63 x PI 86.504	467	164	473.2:157.8	.7
Clark 63 x PI 243.532	349	111	345:115	.7

In the F_3 of PI 229.342 x Clark 63, 49 sensitive F_2 plants bred true, 31 tolerant F_2's bred true, and 76 tolerant F_2's segregated 3:1 (1111:390, expected 1125.8:375.2, X^2P = .4).

Thus there is good evidence for control of the bentazon-sensitive reaction by a single recessive gene to which we have assigned the symbol hb. Clark 63 has the allele Hb for the tolerant reaction to the herbicide.

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1. E_2 and E_3 maturity gene tests.

Bernard (1971) reported on two major genes, E_1 and E_2, that affect the time of flowering and maturity of soybeans. Buzzell (1971) reported another maturity gene, E_3; the recessive allele did not respond to fluorescent-daylength treatment. Kilen and Hartwig (1971) reported a recessive gene for a similar character in southern varieties.

A number of Illinois backcross-derived lines of 'Clark', which differed in maturity, were classified at Harrow for their fluorescent-daylength response. L63-2404, an early maturing line from Clark[6] x T141, gave an

insensitive response typical of $\underline{e}_3$. An F_2 population of L63-3117 ($\underline{e}_2\underline{e}_2$ from Clark[6] x T245) x L63-2404 was grown at Urbana in 1970 and classified for maturity at approximately weekly intervals. The plants were harvested individually. Some F_3 plants of each were tested at Harrow for fluorescent-daylength response and some were rated for maturity ($\underline{E}_2/\underline{e}_2$ and $\underline{E}_3/\underline{e}_3$) in the field at Urbana in 1971. There were a few discrepancies between the greenhouse and field ratings for $\underline{E}_3/\underline{e}_3$ but these were clarified by retesting those lines in 1972.

The results (Table 1) confirm that $\underline{E}_3$ is at a different locus than $\underline{E}_2$. A test for independence gave a chi-square value of 8.25 which at 4df has a probability value of .08; thus, we concluded that the two genes segregated independently.

The 1971 plot maturities at Urbana were as follows:

Strain	Genotype	Average date mature	Days earlier than Clark
L71-920 (Clark-$\underline{e}_2\underline{e}_3$)	$\underline{e}_2\underline{e}_2\underline{e}_3\underline{e}_3$	Sept. 4	30
L63-3117 (Clark-$\underline{e}_2$)	$\underline{e}_2\underline{e}_2\underline{E}_3\underline{E}_3$	Sept. 10	24
L63-2404 (Clark-$\underline{e}_3$)	$\underline{E}_2\underline{E}_2\underline{e}_3\underline{e}_3$	Sept. 18	6
Clark	$\underline{E}_2\underline{E}_2\underline{E}_3\underline{E}_3$	Oct. 4	0

$\underline{E}_2$ and $\underline{E}_3$ did not have an equal effect in delaying maturity, and when combined they had less than an additive effect.

Tests for allelism (Table 2) indicated that the gene which Kilen and Hartwig studied in 'Arksoy' and the gene which Buzzell studied in 'Blackhawk' are the same, and that this gene is the same as in L63-2404.

Table 1

Number of F_2 plants for each genotype from Clark-$\underline{e}_2\underline{e}_2\underline{E}_3\underline{E}_3$ x Clark-$\underline{E}_2\underline{E}_2\underline{e}_3\underline{e}_3$ (L63-3117 x L63-2404)

	$\underline{E}_3\underline{E}_3$	$\underline{E}_3\underline{e}_3$	$\underline{e}_3\underline{e}_3$
$\underline{E}_2\underline{E}_2$	10	11	8
$\underline{E}_2\underline{e}_2$	16	24	8
$\underline{e}_2\underline{e}_2$	4	13	3

Table 2

Soybean response to natural daylength extended to 20 hours with cool-white fluorescent light

	No. of plants flowering		Mean days to flower
	Late	Early	
Arksoy	0	6	43
Blackhawk	0	6	36
L63-2404 (Clark-$\underline{e}_3$)	0	11	38
Arksoy x Blackhawk F_2	0	95	37
Blackhawk x L63-2404 F_2	0	135	37
L63-2404 x Arksoy F_2	0	115	38

References

Bernard, R. L. 1971. Two major genes for time of flowering and maturity in soybeans. Crop Sci. 11: 242-244.

Buzzell, R. I. 1971. Inheritance of a soybean flowering response to fluorescent-daylength conditions. Can. J. Genet. Cytol. 13: 703-707.

Kilen, T. C. and E. E. Hartwig. 1971. Inheritance of a light-quality sensitive character in soybeans. Crop Sci. 11: 559-561.

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1. Evidence of a multiple allele for male sterility.

Segregation for male sterility was observed in an F_3 row from the cross of L67-533 (Clark-$\underline{S}$, short internode) x SRF300 at Urbana, Illinois in 1971. The observed segregation was 63 fertile : 21 sterile (expected 63:21,